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regarded as classics. To lovers of birds the names of their authors, Audubon, Wilson and Nuttall, are as familiar as those of Milton, Dante and Shakespeare. Nuttall's book was the less pretentious of the three, having no colored plates and selling at a price which brought it within reach of a large constituency.

Nuttall was primarily a botanist, and not a few of his admirers who know him only from the excellence of his ornithological writings will be surprised to learn that for about ten years (1825-1834) he was Curator of the Botanic Garden and lecturer on natural history at Harvard, being Asa Gray's predecessor; and that the high character of his work placed him in the front rank of early American botanists.

In seeking new plants he made an expedition into Arkansas, and afterward, in company with Capt. Wyeth and J. K. Townsend, crossed the continent from Atlantic to Pacific, following the difficult overland route later known as 'The Oregon Trail.' His field work led him into all sorts of out-of-the-way places where he was constantly meeting strange and interesting birds. That he took an affectionate interest in their doings is shown by his biographies, which are original, faithful and entertaining and show an intimate personal familiarity with the species of which he wrote. Besides, they furnished what was then so much needed, a brief narrative of the life history, breeding habits and distribution of each as at that time known. In speaking of the book a modern writer has said: "Nuttall, like good wine, does not deteriorate with age." The original edition was long ago exhausted and for many years has commanded a relatively high price—the two volumes commonly selling for \$25, or even \$30.

In order to keep this excellent work within reach of the ever-increasing number of students and lovers of birds, Mr. Montague Chamberlain brought out, in 1891, a new and revised edition. The new edition differed from the original in several important respects: While the text and sequence of the biographies were in the main unchanged, the birds were given their modern names, Western species were omitted, the descriptions of species were rewritten, a paragraph was added giving the geographic range as at present known, and additional species were in-

cluded so as to embrace all the birds now known from the eastern United States and Canada. In all cases, the additional matter was printed in different type from the body of the work, so that Nuttall's original text was clearly set off from the matter contributed by the editor. The title page was misleading, as it failed to indicate the fact that the Western species had been left out, but in the new edition (1896) this is corrected, the new title page reading: 'A Popular Handbook of the Ornithology of Eastern North America.' The book is printed from the same plates as the previous edition, but corrections and additions have been made in the matter contributed by the editor. It is illustrated by text figures and colored plates. The latter might better have been omitted, although it is true that the majority of them may be recognized if looked at through a veil or smoked glass to deaden the unnaturally brilliant colors so characteristic of cheap chromolithographs. It is only fair to the author to state that he is in no way responsible for these plates; they were introduced by the publishers against his desire. The text figures are much better. They are of two kinds: (1) cuts borrowed from Baird, Brewer and Ridgway's *History of North American Birds* and mostly of high excellence; and (2) figures drawn for the book and mostly unsatisfactory. The latter have a coarse look and evidently were intended for greater reduction; they suffer by contrast with the more finished drawings among which they are scattered.

Mr. Chamberlain has done a public service in enabling the younger generation of bird students to add this classic to their libraries. This will be especially appreciated by those who care more for a bird in the bush than a bird in the hand—who love birds for what they are and what they do in life—for Nuttall's biographies possess a freshness and charm which time can never efface.

C. H. M.

The Cell. Outlines of General Anatomy and Physiology. By DR. OSCAR HERTWIG. Translated by M. CAMPBELL and edited by H. J. CAMPBELL, M. D. London, Swan, Sonnenschein & Co.; New York, Macmillan & Co. 1895. 8vo., cloth, 368 pp., 168 figs. \$3.00.

The Cell in Development and Inheritance. By EDMUND B. WILSON, PH. D., Professor of Invertebrate Zoology, Columbia University. New York and London, Macmillan. 1896. 8vo, cloth, 371 pp., 142 figs. \$3.00.

These two recent books on the same subject by well known investigators, the one in Germany, the other in America, serve to mark a new stage in the differentiation of the biological sciences—the separation of cytology from histology as an independent science. Although, as their titles indicate, they attempt to cover much the same ground, they show a marked dissimilarity in several respects—a dissimilarity which it is worth while to emphasize.

First, however, a word as to the common ground covered. Both consider especially the structure and chemical composition of cytoplasm and nucleus, the phenomena of cell-division, the germ cells in their development and union, and the theories of inheritance from the cytological standpoint. Both works give full bibliographical references.

The most important difference between them arises from the fact that Wilson's work was written three and a-half years after Hertwig's. Wilson is thus able to use the results of the extraordinary activity in cytological research which has characterized the last third of a decade. Aside from this, the standpoint of the authors is slightly different, for Hertwig devotes nearly a third of his book to the results of experimental physiological study on the cell, while these are only incidentally considered by Wilson. Thus only in Hertwig's book do we find a systematic discussion of protoplasmic movement and the phenomena of irritability, metabolism and formative activity. Wilson, on the other hand, discusses more fully certain matters of recent observational study, such as the origin of the tetrads and reduction of the chromosomes. Thus while the scope of Hertwig's work is broader, Wilson's is more recent and more thorough as concerns cell morphology.

The general method of presentation of the subject in Wilson's work is in the highest degree pleasing. It retains the impress of its origin in a semi-popular course of lectures, which makes it easy reading, while the style is clear

and interesting—qualities too rarely found in technical works. Each topic is usually begun with a general outline of our present knowledge of the matter, and this is followed by a more detailed and critical presentation of the facts. The historical method of developing the subject is not usually adopted, for this does not lend itself well to the needs of a text-book on a descriptive science.

Hertwig, on the other hand, has a rather heavy, colorless style, and in the translation all of the faults of the original are exaggerated. Indeed, the work has suffered terribly in the attempt to dress it in a new language. An example or two must be given. Thus Hertwig says, very truly, that the latent properties of the cell which become evident only during development "nennt man [in Germany] Anlagen." What, on the other hand, will be the astonishment of the cytological reader of the translation to learn (page 335) that [presumably by the English-speaking cytologists] they are called *fundamental constituent attributes*! In other places the translator appears as ignorant of German as of biology. Thus in one place Hertwig says: "Eine tiefere Bedeutung gewannen diese Thatsachen aber erst, als am Ende des 18. Jahrhunderts sich eine mehr philosophische Betrachtungsweise der Natur Bahn brach." This might be translated thus: These facts [of the cell] did not acquire a deeper significance, however, until the end of the eighteenth century, when a more philosophical manner of regarding nature began to predominate. The translator makes it read (page 2): "Much greater importance, however, was attached to these facts after the investigations, which were carried on in a more philosophical spirit by Bahn [!] towards the end of the eighteenth century, were published." It is unnecessary to state that the philosophic 'Bahn' does not figure in Engelmann's Bibliotheca. Numerous other instances might be given of sentences in which the original meaning is wholly distorted and which are even, in themselves, meaningless, and scores of others in which the greatest liberties have been taken with the original, causing the author to say what he certainly would have avoided saying. The translation is, on the whole, wretchedly done, and bad and

good are so intermingled that the uninitiated reader cannot know what is reliable and what is false.

While Wilson's book leaves little to be desired in respect to careful statement, there is one ground for serious regret, namely, the omission of reference to certain important American papers. We may excuse this in a foreigner, but not in an author in Prof. Wilson's position. Thus, Kofoid's papers upon cleavage in *Limax* are not referred to in the whole book, yet he first called attention to the failure of Balfour's law referred to on page 273. Also his contributions to the laws of spiral cleavage are of the first importance.

A comparison of the press work of the two books reveals as great a difference as the matter. For in the translation of Hertwig the type is small and worn and the numerous half-tone reproductions are frequently muddy—like the translation. On the other hand, the type in Wilson's book is beautifully clear and the figures, which are nearly all new to text-books, are all that could be desired. The work is indeed a model in the beauty of its illustrations.

While it is impossible to summarize such a book as Wilson's, yet a few of its salient features and conclusions on debated questions may be mentioned. Especially noteworthy are the Table showing the number of chromosomes in germ and somatic nuclei of various animals, and the Glossary, which gives the authors and dates of introduction of each term. Although treating fully Bütschli's view of the honeycomb structure of protoplasm, the author believes (page 19) that the fibrillar structure is the more typical. All the organs of cell-division—centrosome, spindle and chromosomes—are to be regarded as differentiations of the primitive nuclear structure (page 67). His conclusions concerning the factors determining development are clearly stated on page 323 as follows: "Development may thus be conceived as a progressive transformation of the egg-substance primarily incited by the nucleus, first manifesting itself by specific changes in the cytoplasm, but sooner or later involving in some measure the nuclear substance itself. * * * Cell-division is an accompaniment, but not a direct cause of differentiation. The cell is no more

than a particular area of the germinal substance comprising a certain quantity of cytoplasm and a mass of idioplasm in its nucleus." These quotations may serve to show that the book is written on broad lines. It certainly takes rank at once among the most important biological works of the period, and it is a book of which its publishers and all Americans may well be proud.

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Physiological Papers. By H. NEWELL MARTIN. Dr. Sci., University of London; A. M., University of Cambridge; M. B., London University; M. D. (Hon.), University of Georgia; late Fellow and Lecturer in Christ College, Cambridge; Fellow of University College, London; Fellow of the Royal Society; Professor of Biology, Director of the Biological Laboratory and Editor of the *Studies from the Biological Laboratory*, Johns Hopkins University, 1876-1894, and Professor of Physiology in the Medical Faculty of the same. *Memoirs from the Biological Laboratory of the Johns Hopkins University* III. Baltimore, The Johns Hopkins Press. 1895.

The book before us is intended to commemorate the connection of Prof. Newell Martin with the Johns Hopkins University. In it are reprinted his physiological papers published from the Biological Laboratory created by him there, and some of the public addresses delivered by him on various occasions in this country. The whole forms a handsome quarto volume, valuable not only from its commemorative significance, but also as uniting conveniently for study and reference a series of important and interesting contributions to medical and biological science.

From the physiological point of view, especially at the present time when the investigation of the isolated mammalian heart is being actively renewed, most interest attaches to the papers in which Prof. Martin described the evolution of what he himself termed the Baltimore method for the isolation of the mammalian heart, and many of the most important results obtained with it. The mutual influence exercised on one another by the dif-